



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/664,332	09/18/2000	Noriya Hayashi	001195	4422

23850 7590 01/31/2005

ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP
1725 K STREET, NW
SUITE 1000
WASHINGTON, DC 20006

EXAMINER

SELLERS, ROBERT E

ART UNIT

PAPER NUMBER

1712

DATE MAILED: 01/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/664,332	Applicant(s) HAYASHI, NORIYA	
	Examiner Robert Sellers	Art Unit 1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 6-10, 12, 17-19 and 21-28 is/are pending in the application.
- 4a) Of the above claim(s) 9, 17-19, 21 and 23-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-8, 10, 12, 22, 27 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1712

1. This is responsive to the Request for Continued Examination filed December 27, 2004 along with the 37 CFR 1.132 declaration.
2. Claims 9, 17-19, 21 and 23-26 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on March 6, 2002.

The text of section 103(a) of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-3, 6-8, 10, 12, 22, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamazu et al. Patent No. 5,359,017; Buchwalter et al. Patent No. 5,879,859; Starkey Patent No. 5,384,339 and Green Patent No. 4,252,592 in view of Green Patent No. 4,299,938.

The rejection is maintained for the reasons of record set forth in the previous Office actions. The arguments and declaration filed December 24, 2004 have been considered but are unpersuasive.

3. The declaration attempts to demonstrate the criticality of the claimed molar ratio of anhydride curing agent to photopolymerizable resin of from 0.3:1 to 1.4:1 by comparing the extent of curing of Test I (molar ratio of 0.65:1) with Test II (molar ratio of 0), Test III (molar ratio of 0.01:1) and Test IV (molar ratio of 2.5:1).
4. Hamazu et al. does not exemplify compositions with an anhydride curing agent, although an acid anhydride is disclosed in column 5, line 14.

Art Unit: 1712

5. Green '592 does not exemplify compositions containing an anhydride curing agent, although an acid anhydride is disclosed in column 4, line 17.

6. Starkey does not exemplify formulations with an anhydride hardener, although the use of an anhydride thermohardening catalyst (col. 21, lines 33-49) such as the elected species of maleic anhydride (col. 21, lines 38-39) is disclosed at a level of as much as 10 parts by weight per 100 parts by weight of an epoxy resin (col. 21, lines 12-15). The elected species of 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate is shown in Examples 2 (cols. 21-22) and 5 (col. 23) along with an aromatic sulfonium salt. The molar quantity of maleic anhydride is $10 \div 98.6 \text{ g/mole} = 0.316 \text{ mole}$. The molar concentration of 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate is $100 \div 316 = 0.316 \text{ mole}$. The molar ratio of curing agent:photopolymerizable resin is $0.10 \div 0.316 = 0.32:1$ which is within the claimed parameters.

7. Buchwalter et al. (col. 9, Example 1) shows a blend of 1.8 parts by weight of acetal diepoxide (i.e. acetaldehyde bis(3,4-epoxycyclohexylmethyl)acetal according to col. 3, lines 13-15), 0.91 part by weight of hexahydrophthalic anhydride and a photoinitiator such as the disclosed sulfonium salt (col. 3, line 22). The molar amount of anhydride is $0.91 \div 154.17 \text{ g/mole} = 0.0059 \text{ mole}$. The molar proportion of diepoxide is $1.8 \div 283 \text{ g/mole} = 0.0064 \text{ mole}$. The molar ratio of curing agent:photopolymerizable resin is $0.0059 \div 0.0064 = 0.93:1$.

Art Unit: 1712

8. Accordingly, the closest prior art example is Example 1 of Buchwalter et al. wherein the molar ratio of curing agent:photopolymerizable resin is 0.93:1 which is embraced by the claimed limits of from 0.3:1 to 1.4:1. Tests II-IV of the declaration are not germane to the composition of Buchwalter et al. since the molar ratio is exhibited.
9. The references set forth epoxy resins which are within photopolymerizable resin according to page 26, lines 9-11 of the instant specification, aromatic sulfonium salts such as the elected species of benzyl-4-hydroxyphenylmethysulfonium hexafluoroantimonate of Hamazu et al. (col. 3, lines 29-30, corresponding to claimed formula IV) and anhydride curing agents with a molar ratio of curing agent:photopolymerizable resin of 0.32:1 disclosed in Starkey or 0.93:1 shown in Buchwalter et al.
10. The claims are directed to a composition "which can be cured with an energy ray (claim 1, line 2)" and "which makes it possible to cure by chain reaction (line 3)." There are no affirmative limitations requiring the curing of the composition by energy ray and by chain reaction. The prior art considered as a whole shows (with respect to Buchwalter et al.) or discloses (regarding Hamazu et al., Starkey and Green '592) the claimed mixture of epoxy resin, anhydride curing agent and an aromatic sulfonium salt which is within the realm of the claims regardless of the possible curing mechanism.

Art Unit: 1712

11. Even if, arguendo, the curing mechanism is considered, the capability of curing the compositions of the references by energy ray addresses the claimed capability of curing by irradiation with an energy ray which embraces ultraviolet radiation (specification, pages 66-67, Example 2). Hamazu et al. (col. 22, lines 67-68 and col. 23, line 61 to col. 24, line 3, ultraviolet radiation), Buchwalter et al. (col. 9, lines 14-15, electromagnetic radiation), Starkey (col. 14, lines 3-5, ultraviolet radiation) and Green '592 (col. 2, lines 7-15, actinic radiation) espouse curing by energy ray.

12. Based on the equivalent formulations of the prior art and claims containing an epoxy photopolymerizable resin, an anhydride curing agent and an aromatic sulfonium salt encompassed by formula IV (Hamazu et al.) curable by energy ray, the compositions of Hamazu et al., Buchwalter et al., Starkey and Green '592 inherently cure by chain reaction.

13. Green '938 teaches a polyhydric alcohol such as polyethylene glycol (col. 8, lines 13-14) as a co-curing agent with an anhydride (col. 12, lines 18-19) as required in claims 2, 6, 7 and 10 in a formulation comprising 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate (col. 7, lines 54-55) and an aryoxysulfoxonium salt photoinitiator (col. 4, line 55 to col. 5, line 12).

Starkey espouses a mixture of an anhydride and a polyol such as polyethylene glycol (col. 7, line 31) which adjusts the molecular weight and controls the degree of crosslinking (col. 3, lines 17-19; col. 7, line 67-68 and col. 8, lines 14-15).

Art Unit: 1712

14. It would have been obvious to incorporate the polyethylene glycol of Green '938 and Starkey with the anhydride curing agent of Hamazu et al. and Buchwalter et al. in order to control the degree of crosslinking (Starkey).

(571) 272-1093 (Fax no. (703) 872-9306)
Monday to Friday from 9:30 to 6:00 EST

Any administrative inquiries can be obtained by accessing the Patent Application Information Retrieval (PAIR) system. Published applications are available through either private or public PAIR. Unpublished applications are available via private PAIR only. Consult <http://pair-direct.uspto.gov> or contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).



Robert Sellers
Primary Examiner
Art Unit 1712

rs
1/26/05